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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/551,585

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Martin O. Leach

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EXAMINER

NGUYEN, HIEN NGOC

ART UNIT

PAPER NUMBER

3768

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/551,585	Applicant(s) LEACH ET AL.	
	Examiner HIEN NGUYEN	Art Unit 3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 57-78 and 80-110 is/are pending in the application.
- 4a) Of the above claim(s) 80-110 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 57-78 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/23/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is responsive to the Arguments/Amendments filed 05/11/2010. Claim 79 have been canceled. Claims 57-78 and 80-110 are now pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 57-64 and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dong et al. (Rectification of distortion in MRI for stereotaxy (applicant submitted reference in IDS)) and in view of Haacke EM et al. (Magnetic Resonance Imaging (applicant submitted reference in IDS)).

3. Addressing claim 57, Dong discloses a method of acquiring and processing Magnetic Resonance Image (MRI) data from Nuclear Magnetic Resonance signals generated by an object within a magnetic field having a predetermined spatial gradient, for use in reconstructing an image representing said object, the method comprising the steps of: acquiring a first set of first image data items using a first value of said predetermined spatial gradient for use in constructing a first image of said object (see abstract and page 184, i_1 is the first image constructed from first image data); acquiring

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a second set of second image data items using a second value of said predetermined spatial gradient which differs from said first value thereof for use in constructing a second image of said object (see page 184, especially after equation 6, i_2 is the second image constructed from second image data) and generating third image data items according to first image data items, second image data items and the ratio of said different first and second values of said predetermined spatial gradient (see page 185, especially top of the page to equation 11, rectify image is the third image data generating from first image data and second image data). However, Dong does not disclose wherein second image data items of said second set are acquired before acquisition of said first set is complete. Haacke discloses wherein second image data items of said second set are acquired before acquisition of said first set is complete (see page 803, interleaving scan section, because of interleaving scan the second image data is acquired before acquisition of first set is completed). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dong to perform the step of wherein second image data items of said second set are acquired before acquisition of said first set is complete as taught by Haacke because this would reduce artifacts and improve image quality.

4. Addressing claims 58, 60-61 and 79 Dong discloses wherein said second image data items of said second set acquired before acquisition of said first set is complete are acquired from points in Fourier-Space which coincide with those points in Fourier-Space from which first image data items of said first set are acquired (see page 184, between

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equation 1 and 2, and the last paragraph before equation 7, identical image parameter means points in Fourier Space are the same in both first and second images); selected set of points in steps (a) and (c) each forms a respective line of points in Fourier-Space wherein a set of points selected in step (c) forms a line of points being substantially parallel to a line of points formed by the selected set of points employed in preceding steps (a) and (b) (see page 185, top of the page to equation 11); wherein the ratio of said different values of said predetermined spatial gradient is a constant value (see page 184, section between equation 6 and 7, reversal in the direction of the readout gradient means the different in gradient is constant and opposite in polarity) and a method of reconstructing nuclear Magnetic Resonance images (MRI) or other images using the method of Claim 57 (see rejection of claim 57).

5. Addressing claims 62-64, Dong discloses generating the third image data according to the first image data items and second image data using equation in applicant claims 62-63 and different values of predetermined spatial gradient is substantially equal to -1 (see page 185, equation 10 and 11, take into account -1 equation 10 and 11 would look like applicant's equation).

6. Addressing claim 59, Haacke discloses acquiring said first set of first image data items and said second set of second image data items includes the steps of: (a) acquiring first image data items from a selected set of points in Fourier-Space (see Fig. 26.17 on page 804); and (b) acquiring second image data items from said selected set

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of points in Fourier-Space (see Fig. 26.17); and c) selecting a new set of points in Fourier-Space and repeating steps (a) and (b) in respect of said new selected set of points until acquisition of said first set is complete (see Fig. 26.17, this figure shows continuously acquire first data set and second data set at different set of points).

7. Claims 65-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dong et al. (Rectification of distortion in MRI for stereotaxy (applicant submitted reference in IDS)), in view of Haacke EM et al. (Magnetic Resonance Imaging (applicant submitted reference in IDS)) and further in view of Pelagotti (US 2003/0035583).

8. Addressing claims 65-71, Dong and Haacke fail to disclose defining boundary vector, segmenting the images using weight factor and average different. Pelagotti discloses boundary vector and segmenting the images using weight factor (see [0006], [0018-0019], [0032] and claim 5). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dong to defining boundary vector, segmenting the images using weight factor and average different as taught by Pelagotti because this process improves image quality and allow easier image analysis.

Examiner suggests amending the claims to include specific detail about the method steps of defining boundary vector, segmenting the images using weight factor and average different to differentiate from the current prior art. Also point out the criticality of these steps.

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9. Claims 72-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dong et al. (Rectification of distortion in MRI for stereotaxy (applicant submitted reference in IDS)), in view of Haacke EM et al. (Magnetic Resonance Imaging (applicant submitted reference in IDS)) and further in view of Murakawa (US 2001/0046321).

10. Addressing claims 72-78, Dong and Haacke fail to disclose compare image data and determine similar feature. Murakawa discloses compare image data and determine similar feature (see [0017] and claim 11, when images are compare user could divide pixels in the images into subset of $\frac{1}{2}$ then the pixels in the subset are compared). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dong to compare image data and determine similar feature as taught by Murakawa because an accurate image search can be performed by comparing image data and determine similar feature.

Response to Arguments

Applicant's arguments filed 05/11/2010 have been fully considered but they are not persuasive. Applicant argues it would not have been obvious to one of ordinary skill in the art at the time of the invention to modify Dong to solve a problem of correcting for geometric distortions arising in MRI images, due to distortions of the magnetic field, for images that vary during or between successive image acquisition sequences due to movement of the subject because this problem is not present in the technique discussed in Dong. Applicant argues that in Dong et al. the patient is secured to a rigid

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frame, therefore, there should be no movement of the patient so taking additional images for correction is not needed. Applicant's argument is not persuasive because Dong discloses correction of geometrical distortion in MRI by taking additional images (see page 182, last paragraph, page 183, first paragraph, pages 183-184, MRI Distortion and Rectification section, i_2 is the additional image). Applicant argues subtracting the two images in Dong would not result in an image which is corrected for geometrical distortion. Applicant's argument is not persuasive because correcting geometrical distortion by taking additional images and modify images using additional images is disclosed by Dong (pages 183-184, MRI Distortion and Rectification section). Dong corrected geometrical distortion by subtracting or modifying the images. Applicant argues it would not have been obvious to one of ordinary skill in the art at the time of the invention to combine Dong with Haacke because Dong requires a reversed readout gradient for the second image and Haacke requires identical gradients or gradient structures should be oscillatory and fast. Applicant's argument is not persuasive because oscillatory gradient is similar to reverse gradient (see Fig. 26.17). Haacke does not restrict the gradient to be identical. Further, examiner only relies on Haacke for the teaching of second image data items of said second set are being acquired before acquisition of said first set is complete. Dong in combination with Haacke discloses all claim limitations.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIEN NGUYEN whose telephone number is (571)270-7031. The examiner can normally be reached on 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571)272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. N./

Examiner, Art Unit 3768

/Long V Le/

Supervisory Patent Examiner, Art Unit 3768